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A new species of *Ophiocordyceps* (*Clavicipitales, Ascomycota*) from southwestern China

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Abstract — A new species of caterpillar fungus, *Ophiocordyceps laojunshanensis*, is described based on specimens collected from southwestern China. This species is characterized by slender stromata, sparse perithecia, and the unique habitat of growing in mosses. Its habitat, gross morphology, and microscopic features are illustrated and relationships to similar species discussed.

Key words *Cordyceps, Ophiocordyceps sinensis, Ophiocordycipitaceae,* taxonomy

Introduction

The genus *Cordyceps* includes over 400 species, of which 120 species have been reported in China (Liang 2007). Although the genus was formerly classified in the *Clavicipitaceae*, based on recent results of the multi-gene phylogeny of *Cordyceps* sensu lato, the taxonomy of both *Cordyceps* and the *Clavicipitaceae* has been revised.

A new family *Ophiocordycipitaceae* has been proposed based on the genus *Ophiocordyceps* Petch, which has been emended by Sung et al. (2007). *Ophiocordyceps* is now characterized by stromata that are darkly (or rarely brightly coloured) pigmented, tough, fibrous, pliant to wiry and rarely fleshy, often with aperithecial apices or lateral pads, perithecia that are superficial to completely immersed and arranged ordinally or obliquely (Sung et al. 2007).

In the past three years, the authors undertook numerous mycological explorations to mountainous Northern Yunnan, where they collected many specimens of caterpillar fungi that grow among mosses and have morphological features that do not correspond to any previously described taxa. One new species, *Ophiocordyceps laojunshanensis*, is described and illustrated in this paper.

Materials & methods

Field notes were taken for gross morphology of fresh ascomata and habitat. Detailed macroscopic features were examined under a stereomicroscope (Carl Zeiss Discovery 12). Microscopic examination of ascomata and measurements of microscopic structures were made from freehand sections under a microscope (Olympus 520). The sections were mounted in 5% aqueous KOH and then Cotton–blue lactophenol. The holotype of *Ophiocordyceps* laojunshanensis was deposited in the Cryptogamic Herbarium, Kunming Institute of Botany, Chinese Academy of Sciences (KUN–HKAS 57066). Isolates from fresh ascomata of *O. laojunshanensis* were maintained on potato dextrose agar with 1% peptone (PPDA) using techniques described by Liu et al (1989), all isolates were kept in Key Laboratory of Tropical Forest Ecology, Xishuangbannan Tropical Botanical Garden, Chinese Academy of Sciences (No. lao1–lao20).

Taxonomy

Ophiocordyceps laojunshanensis J.Y. Chen, Y.Q. Cao & D.R. Yang, **sp. nov.** Fig. 1

MycoBank MB 517206

Stromatibus clavatis, singularibus, 47.0 93.0 mm longis, 1.0 3.9 mm crassis. Capitulis cylindricis, 8.5 17.0 mm longis, prophyro brunneis vel atro brunneis, apis acerosis sterilibus 3.5 8.0 mm longis. Perithecia globosa, 200 300 × 200 350 µm; Stipitibus, 25.0 72.0 mm longis; Asci clavuli, cylindraci, 165 275 × 11.5 14.5 µm. Ascosporis hyalinis, filiformis, multiseptatis, 130 250 × 5.0 6.0 µm.

Type: China: Yunnan Province, Lijiang Naxi Autonomous Prefecture, Laojunshan mountain, 26°37'33.76N 99°42'58.07E, alt. 3974 m; under *Rhododendron mariae* Hance; associated with *Oncophorus wahlenbergii* Brid. and *Pleurozium schreberi* (Brid.) Mitt., 8 May 2009, Ji yue Chen 09032.(**Holotype:** KUN HKAS 57066).

Etymology: The epithet refers to the type locality, Laojunshan Mountain

Stromata clavate, slender, simple, rarely 2 or 3 from host head, rarely 1 from host head and another from the terminal region, 47.0–93.0 mm long, 1.0–3.9 mm in diam. Ascogenous portion almost 1/5 to 1/3 of the stromata length, cylindrical, 8.5–17.0 mm long, purplish to dark brown. Apex sterile acuminate, 3.5–8.0 mm long. Perithecia, globoid, 200–300 × 200–350 µm. arranged loosely in irregular lateral cushions. Stipe 25.0–72.0 mm long. Asci clavate, 165.0–275.0 × 11.5–14.5 µm. Ascospores hyaline, filiform, septate, 130.0–250.0 × 5.0–6.0 µm (Fig. 1a–f).

Colonies (Fig. 1g–l) grew very slowly, only up to 6–10 mm in diameter after 2 months on PPDA at 16°C. They were white at first, then became brown–yellow or black brown, and sparse white mycelia emerged 3 month later, with conidiophore and conidia, reverse blackish brown. Conidiophore, hyaline, branching or non–branching; conidiogenous cell phialidic, hyaline, with verrucose, acerate, 15–39(–50) µm long; Conidia, hyaline, long elliptic, 6.0–13.5 × 3.0–4.0 µm, one or two encased in a mucus drop.

Host: Larvae of *Thitarodes yunnanensis* Nielsen et al. (*Hepialus yunnanensis* Yang et al.)

Fig 1. *Ophiocordyceps laojunshanensis* – a. habitat; b. fresh fruiting body; c. dry fruiting bodies; d. ascogenous portion, bar = 2 mm; e. ascus with ascospore, bar = 20 µm; f. ascus tip, bar = 20 µm; g h. culture (bar = 5 mm): g. surface, h. reverse; i. colonies, bar = 20 mm; j. conidiophore and conidia, bar = 20 µm; k. conidiophore (detail), bar = 25 µm; l. conidia (detail), bar = 10 µm.

Additional specimens examined: CHINA: yunnan province, Lijiang Naxi Autonomous Prefecture, Laojunshan mountain, 26°37'03.98N 99°42'18.02E to 26°37'82.71N 99°42'97.86E, alt. 3874-4075 m. Under *Abies delavayi* Franch and *Rhododendron mariae* Hance. Associated with *Oncophorus wahlenbergii* Brid., *Dicranum muehlenbeckii* Bruch & Schimp. or *Pleurozium schreberi* (Brid.) Mitt., 8 May 2009, Ji yue Chen 09033 09035.

Discussion: *Ophiocordyceps laojunshanensis* is characterized by slender stromata, sparse perithecia, and its unique habitat of growing among mosses. It strongly resembles the most precious caterpillar fungus, *O. sinensis* (Berk.) G.H. Sung et al., and is often sold together with that fungus. The two species could be living in the same host larvae, except that *O. laojunshanensis* is found most often growing among mosses, while *O. sinensis* appears to grow more frequently in grasslands. Morphologically, *O. laojunshanensis* differs from *O. sinensis* by having a slimmer stroma with a shorter ascogenous portion and relatively sparse irregular perithecia compared to the close ordered perithecia found in *O. sinensis*.

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